

THE AUSTRALIAN PLANT DISEASE RECORDER.

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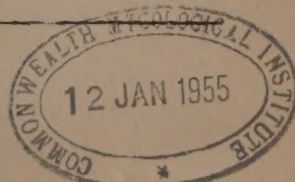
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For private circulation to plant pathologists within Australia.



PLANT DISEASE NOTES.FIELD AND FODDER CROPS.LEAF CURL OF TOBACCO:

In 1953 about 500 tobacco plants were grown at the Kimberly Research Station on the Ord River in the north-western corner of Western Australia. Leaves of one plant were curled and twisted and had well-developed leafy outgrowths on the under surface. Early in July 1954, a batch of 5 plants, similarly affected, was received from the Kimberly Research Station. These represented about 60 plants of the 500 transplanted at the end of May and grown under irrigation.

The stunted diseased plants were typical of leaf curl of tobacco as described in some detail by Pal and Tandon in 1937 under the title "Types of tobacco leaf curl in Northern India". (Indian J. agric. Sci. 7: 363-393.)

More recently Wolf, Whitcomb and Mooney (J. Elisha Mitchell sci. Soc. 65: 38-47, 1949) dealt with its occurrence in Venezuela and briefly reviewed earlier literature on the disease. It has been recorded in various parts of Africa, in Java, Sumatra, India, Rumania, Russia, Brazil and Venezuela. As far as I know this is the first record of its occurrence in Australia.

Leaf curl is caused by a virus which can be transmitted to many species of plants by white flies, of which at least four species act as vectors. There are possibly three different leaf curl viruses, affecting tobacco, cotton and yuca respective and several strains, involved in the leaf curl complex.

C.S.I.R.O.,
Canberra.

- A.V. HILL.

DAMAGE BY CORTICIUM FUCIFORME TO PASTURES IN TASMANIA:

Since my previous note on diseases of pasture (A.P.D.R. 6:3:33, 1954) further cases of Corticium fuciforme damage to pasture have been observed. The damage has varied from a few isolated patches in a paddock to large areas of several acres showing general severe reduction in the growth of the grass component of the pasture. One of the worst cases observed was at Sheffield, where the fungus had caused particularly severe damage to the leaves of perennial rye grass so that the pasture had become markedly clover dominant. From observation and by culturing from affected plants it appeared that most of the attack had occurred on the above ground portions of the plants. Root damage due to this pathogen was not demonstrated and consequently regrowth will take place. However the organism has had a very serious effect on the forage available during the late autumn and winter. It also appears possible that it may permanently affect the composition of the pasture. Apart from the dominance of clovers it was also noted that poor quality grasses and weeds, particularly Yorkshire fog (Holcus lanatus) had become established in the patches where rye grass growth was very severely reduced. Although H. lanatus was often attacked by Corticium it appeared to suffer much less damage than rye grass.

Department of Agriculture,
Hobart.

- G.C. WADE.

BACTERIAL BLIGHT OF FODDER BEET:

Although bacterial blight, Pseudomonas aptata (Brown & Jamieson) Stevens had been recorded in New South Wales on nasturtium (Tropaeolum majus) in 1934 Noble R.J. Internat. Bull. Plant Protection 2:1:2-4, 1935) this organism has not previously been recorded here on plants of the genus Beta.

Recently, specimens of fodder beet (B. vulgaris) were forwarded from Taree, on the Central Coast of New South Wales, showing typical symptoms of bacterial blight, as described by Elliot, (Manual of Bacterial Plant Diseases, Second Edition 1951, p.56) and by Walker (Diseases of Vegetable Crops 1952, p.60). The bacterium was isolated and the disease was reproduced by inoculation to healthy fodder beet plants.

It was stated that the incidence of the disease increased considerably soon after a succession of heavy frosts late in May. The possibility of frosting resulting in increased spread of this disease is interesting in view of recent work by Wark (Aust. J. agric. Res. 5:3:365-371, 1954) on the influence of low temperatures on the development of bacterial blight of peas (Pseudomonas pisi Sackett).

Department of Agriculture,
Sydney.

- R.J. CONROY.

VEGETABLES.DISEASE RESISTANCE IN BEANS:

A back crossing programme to build up disease resistance in the Brown Beauty variety has been in progress since the spring of 1952. Diseases which are being taken into account, together with the corresponding sources of resistance are:-

Rust (Strain 17 a)	Californian Small White, Florida Belle Landreth, Westralia.
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Angular leaf spot	Californian Small White.
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Anthracnose (One strain)	Highly resistant Brown Beauty selections
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Mosaic (Bean virus 1)	Immune Brown Beauty selections
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Progeny of the Small White - Brown Beauty cross is segregating for resistance to both rust and angular leaf spot. Dwarf rust-resistant types have been obtained in five generations by back-crossing successive first generation hybrids (in which resistance is incompletely dominant), but selection and possibly further back crossing will be needed to fix leaf-spot resistance.

The crosses with Landreth, Florida Belle and Westralia are being bulked for selection of potential breeding stocks. In all back-crossing the anthracnose and mosaic resistant Brown Beauty selections are being used.

From the material at hand it should be possible to obtain within reasonable time a Brown Beauty type bean with resistance to the diseases mentioned.

Department of Agriculture,
Brisbane.

- J.C. JOHNSON.

UNIT 101

RESISTANCE TO DISEASE

A much extended programme to bring us diseases resistance in the brown honey variety has been in progress since the spring of 1952. Diseases which are being taken into account, together with the corresponding sources of resistance are:-

Heat (Resistance 7) California Small Cell White, Florida White, Langstroth, Westphalia.

Angular Leaf California Small White, West

Antennae-borne flying resistant brown honey selections (one strain)

Wests Immune brown honey selections (one strain)

Many of the small also - brown honey cross is resistant to resistance to both heat and angular leaf. Heat and resistant types have been obtained in that selection of brown honey successive first generation (in which resistance is incompletely dominant), but selection and possibly further generations will be needed to fix resistance.

The crosses with Langstroth, Florida White and West- being raised for selection of potential breeding strains. In all such crosses the resistance and genetic material from honey bees are being used.

From the material at hand it should be possible to obtain strains resistant to a brown honey type both in resistance to the diseases mentioned.

Department of Agriculture, Raleigh.

PINK ROT OF POTATO TUBERS:

Pink rot (Phytophthora erythroseptica Pethy.) was recorded on potato in Tasmania in 1943 by N.H. White (Plant Disease Survey of Tasmania for the Three-year period 1943, 1944, 1945, p.24) and J. Brockwell (A.P.D.R., 4:4:43-44, 1952) reported the suspected occurrence of the disease at Canberra in 1952. As far as the author is aware these are the only previous records of this disease in Australia.

In May of this year, specimens of potato tubers forwarded from Hanging Rock, in the Tamworth district of New South Wales were found to be affected with pink rot. The symptoms on the tubers agreed with those described by Pethybridge (Sci.Proc. R. Dublin Soc., 13: 529-565, 1913) and by Goss (Nebraska A.B.S. Res. Bull. 160, 1949). A fungus was isolated and identified as P. erythroseptica and the disease was reproduced by inoculation to healthy tubers.

Crops at Hanging Rock were inspected on 28th May, when digging was in progress and no examination of the tops of the plants was possible. The incidence of pink rot tuber infection was found to be highest in the lower lying sections of the crops. In one crop about 40% of the tubers were infected and in another crop 3%. The varieties concerned were Sebago and Monak.

It appears that infection commenced following 6 inches of rain in early autumn and further infections occurred subsequently during the cool misty weather which characterised the latter part of the growing season and which caused the soil moisture content to remain high. Many tubers had obviously become infected in the region of the eyes, which, according to Cairns & Muskett (Ann.app. Biol., 20: 381-403, 1933), indicates that a high soil moisture level resulted in the germination of sporangia at or near the eyes.

Discussion with growers indicated that the disease had been present in crops in some previous years but was thought to be a manifestation of late blight. It is considered that P. erythroseptica is a natural soil inhabitant in the Hanging Rock area and could cause losses under favourable conditions.

Department of Agriculture,
Sydney.

- R.J. CONROY.

FRUIT:PSUDOMONAS SYRINGAE ON FRUIT TREES IN VICTORIA:Pear:

In A.P.D.R. 6:3:45, 1954, K.E. Hutton reports severe incidence of pear blast (Ps. syringae van Hall) in N.S.W. especially on the variety Packham's Triumph.

Ps. syringae was first isolated from pears in Victoria in the season 1951-52 from the variety Winter Nelis where it was associated with severe blighting of blossoms and fruit clusters.

In subsequent years, the pathogen has been isolated from most of the common pear varieties in Victoria and has caused blossom blight, shoot wilt, branch canker and leader dieback. Fruit lesions have been found so far only on the varieties Josephine and Packham's Triumph and limited observations indicate that the symptoms differ in these two varieties as follows:-

(i) On Packham's Triumph

Moderately large ($\frac{1}{8}$ " - $\frac{1}{4}$ " diam.), discrete, black, sunken lesions with distinct brick-red borders.

(ii) On Josephine

Numerous small, black, fairly shallow pock marks which appear very prominently in patches on the young fruit. As the fruit enlarges and matures, a surface blackening often develops between the lesion aggregates, giving the fruit a russeted appearance. This latter condition may be analogous to that referred to by Hutton for the Keiffer pear consignment from Victoria for which severe seedling loss was reported.

Apricot:

Ps. syringae was first isolated from apricots in Victoria in the season 1953-54 on Trevatts grown in the Cobram and Shepparton districts. Symptoms included severe gumming and blighting of blossom clusters and developing shoots, twig blight and dieback, and leaf and fruit lesions. The fruit lesions were very similar in appearance to those produced by Clasterosporium carpophilum (Lev) Aderh., the shothole fungus.

In A.P.D.R. 6:3:47, 1954, J.R. Morschel described a shothole-like condition of Trevatt apricots occurring in the Murrumbidgee Irrigation Areas, with fruit symptoms varying from a pepper-like spotting to sizeable lesions which slough away leaving the fruit fairly clean at harvest time. The symptoms described by Morschel are almost identical with those found on Trevatts in Victoria during last season, from which Ps. syringae was consistently isolated.

In the course of spray trials conducted in the 1953-54 season for the control of brown rot in apricots, it was noted that the occurrence of the Ps. syringae fruit spotting was considerably reduced by the application of thiram or ziram 0.12% plus 0.5% white oil at "petal-fall" and "shuck-fall." Leaf shothole was not apparent even on control trees on which the fruits were considerably spotted, but the leaf spot caused by Ps. syringae (a red-brown, small circular lesion with a pale green halo) was common.

Cherry:

Ps. syringae was first isolated from cherries in north-eastern Victoria in 1951-52 but the disease has probably existed in Victorian cherry orchards for many years. The organism causes severe gumming and dieback of mature trees and in young orchards is frequently a devastating pathogen.

Apple:

Ps. syringae was isolated from budblight of a Gravenstein apple from Treseco, Victoria, in 1952-53. This, so far, is the only positive identification of Ps. syringae on apple in this State.

Lemon:

Ps. syringae has, for many years, been a disease of economic importance in the lemon growing areas of Victoria.

Spraying trials are being conducted for the control of Ps. syringae in apricot, pear and cherry in Victoria and investigations are continuing to ascertain the importance of this organism over the full range of fruit crops in this State.

Department of Agriculture,
Melbourne.

- H. FREEMAN and
P. T. JENKINS.

ROOT-KNOT OF PEACHES - MELOIDOGYNE JAVANICA:

Root-knot nematodes on perennial crops present a serious problem and at Gosford, N.S.W., root-knot nematode resistant peach rootstocks imported from California, U.S.A., are being tested for resistance to the nematode species present in that area. Seedlings of these Californian lines planted in November, 1953, were lifted in July, 1954, after approximately 8 months growth during the warmer months of the year. Abundant gall development with many mature females had occurred on all the introduction and egg production had been prolific. Examination of the perineal patterns of the mature females showed that the species present at Gosford was Meloidogyne javanica (Treub.) Chitwood (Helm. Soc. Wash. Proc., 16: 2: 90-104, 1949), a species which has not previously been recorded in N.S.W. No other species of Meloidogyne was found in the infested roots, indicating that the rootstocks may have been susceptible only to M. javanica for it is known that M. incognita is widespread in the Gosford area.

In the U.S.A. M. javanica attacks both Yunnan and Shalil peaches, these rootstock varieties being resistant to all other species of root-knot nematode recorded there. Yunnan was included in the Gosford test and was fully susceptible, indicating a similarity in reaction between the local and the American isolates. The distribution of this species in the Gosford area is so far unknown but the heavy infestation on the roots of these "resistant" varieties indicates a high population in at least one location.

Department of Agriculture,
Sydney.

- J.M. FISHER.

VIABILITY OF SPORES ON BROWN ROT MUMMIES:

During the spring and early summer of 1949 samples of Sclerotinia fructicola mummies were collected from a block of canning peaches at Griffith, which was severely infected with brown rot in the 1948-49 season.

The later collected mummies were very weathered and

hardened but were still carrying viable spores in early December.

Date Collected	% Mummies showing viable conidia.
24.8.1949	65%
30.9.1949	60%
30.10.1949	40%
5.12.1949	10%

This suggests that the conidial stage will carry over the brown rot from season to season. To date apothecia have been observed on the Murrumbidgee Irrigation Areas.

Department of Agriculture,
Leeton, N.S.W.

J.R. MORSCHER.

LONGIVITY OF SCLEROTINIA FRUCTICOLA AT LOW TEMPERATURE:

In the course of investigations on brown rot of apricots considerable numbers of apricot fruit were enclosed in sealed polyethylene bags and held in a quick freeze unit at -9°C for 7 months. Some of the bags were then removed and after several days at room temperature Sclerotinia fructicola developed on many of the fruit in the bags.

Department of Agriculture,
Hobart.

- G.C. WADE.

SEPTORIA SPOT INFECTION ON CITRUS:

As a result of a series of inoculation studies carried out during 1953, it has been confirmed that Thompson Navel is slightly more susceptible than Washington Navel to Septoria depressa, whilst Valencia is comparatively resistant.

The earliest stage of infection was not established but from a practical point of view it is valuable to know that peak infection is most likely to occur during April and May.

Attempts were made to study the conditions which cause the fungus to break its latency. It is not possible to demonstrate that either artificial olcocollosis or continuous freezing will cause the symptoms of Septoria spot to appear. It is apparent that there are certain field conditions, which were not simulated in the laboratory tests, but which must operate for the production of Septoria symptoms in the inland citrus areas.

Department of Agriculture,
Lecton, N.S.W.

- J.R. MORSCHEL.

ORNAMENTALS.RUST ON EUPHORBIA MARGINATA:

Euphorbia marginata (Snow on the Mountain), a summer annual with variegated leaves, has become popular in Brisbane gardens in recent years. In late September 1954, seedlings were found severely attacked by rust. Only the uredial state has so far been observed, but there seems little doubt that the rust is the same as that recorded recently from Euphorbia populus in Sydney and Brisbane (A.P.D.R. 6:1:14, 1954 and 6:3:50, 1954).

Department of Botany,
University of Queensland.

-R.F.N. LANGDON.

MISCELLANEOUS PLANTS.WHITE RUST OF HELIANTHUS ANNUUS:

During August 1954, sunflowers (Helianthus annuus) grown by students in the Department of Botany for experimental work in plant physiology were severely attacked by a white rust. Sunflowers have been grown on the site for some years past and have previously been free of diseases.

Most of the leaves on each plant were affected. The lesions, which ranged from a few millimetres to 2 cm. in extent, being often irregular in outline, were characterised by hypertrophy and marked chlorosis. Sori occurred on the ventral leaf surface, the dorsal surface showing only yellow blisters.

Oospores have been found in old lesions. The fungus is Cystopus cubicus de Bary (syn. Albugo tragopogonis S.F. Gray). This is the first record of it from Queensland.

Department of Botany,
University of Queensland.

- R.F.N. LANGDON.

MISCELLANEOUS NOTES.NOMENCLATURE OF PLANT PATHOGENIC BACTERIA:

In response to an article by G.C. Wade in A.P.D.R. 6:3:52, 1954, the following comments are submitted.

There is a very real need in Australia for uniformity in the usage of nomenclature of plant pathogenic bacteria, and it is hoped that this might be considered at some meeting of Australian plant pathologists in the near future. An attempt was made by the author some ten years ago to stimulate interest in uniformity in nomenclature of bacterial plant pathogens (J. Aust. Inst. agric. Sci. 10:2: 78-79, 1944), but with little effect.

The American and Canadian pathologists accepted Dowson's revised genera, Corynebacterium, Pseudomonas and Xanthomonas, but retained the generic name Erwinia instead of Bacterium. As a result of this, the main confusion lies in the usage of Bacterium and Erwinia as was stated by Wade. The American pathologists follow Elliott as set out in her manual of 1951, in which there are six genera, including Bacterium, Erwinia and Agrobacterium. In this there seems to be no apparent reason why the genus Bacterium should be retained. Five species are listed, two of which should be classified as Xanthomonas, one as Agrobacterium, and the remaining two as Erwinia. On the other hand, Dowson's genus Bacterium includes Agrobacterium which appears to be naturally related to the Rhizobiaceae and should therefore stand as a separate genus.

It seems to me that there are five distinct genera of plant pathogenic bacteria, Corynebacterium, Pseudomonas, Xanthomonas, Bacterium or Erwinia, and Agrobacterium. What has to be decided is whether we adopt the American usage of Erwinia or Dowson's of Bacterium. Dowson's argument in favour of the use of Bacterium instead of Erwinia seems a valid one. He stated that "the genus Erwinia was created on one character alone, that of pathogenicity to plants." All the other characters of this genus are equally applicable to the genera Escherichia, Ebertholla and Salmonella and these also agree with Ehrenberg's genus Bacterium. Their generic names Erwinia etc. do not suggest any relationship but merely commemorate four distinguished bacteriologists. For this reason Dowson advocated the use of the generic name Bacterium for all of them.

Faculty of Agriculture,
University of Sydney.

- N.H. WHITE.

BACTERIAL NOMENCLATURE:

As stated by G.C. Wade (A.P.D.R. 6:3:52, 1954), one of the main problems in the nomenclature of plant pathogenic bacteria "lies in the choice between Bacterium and Erwinia. However, in the light of a recent article by Ainsworth and Cowan (J. gen. Microbiol. 10:3: 465-474, 1954), this problem would appear to have been solved.

Ainsworth & Cowan's article deals with some of the more important requirements of the current Botanical & Bacteriological Codes. The Bacteriological Code, approved by the fourth International Congress for Microbiology (1947) has been modified by decisions of the fifth and sixth International Congresses held at Rio de Janeiro (1950) and Rome (1953) respectively. One of the main modifications made to the Bacteriological Code was the rejection by the nomenclature Committee of the generic name Bacterium and the family name Bacteriaceae. Thus, as Ainsworth and Cowan state, "authors must now allocate to other genera those species that they would have included in Bacterium."

It would thus seem that, under the present Code, all those plant pathogenic bacteria formerly known as species of Bacterium should now be known as species of Erwinia.

Department of Agriculture,
Sydney.

- J. WALKER.

NEW RECORDS OF FUNGI FROM QUEENSLAND:

<u>Puccinia chloridis</u>	on <u>Chloris acicularis</u>
<u>Puccinia levis</u>	on <u>Entolasia marginata</u>
<u>Phragmidium darnardi</u>	on <u>Rubus parvifolius</u>
<u>Polystomella sordidula</u>	on <u>Loranthus</u> sp.
<u>Ramularia sidae</u>	on <u>Sida rhombifolia</u>
<u>Ovularia obliqua</u>	on <u>Rumex crispus</u>
<u>Cystopus</u> sp.	on <u>Erythraea australis</u>

Department of Botany,
University of Queensland.

- R.F.N. LANGDON.

MICROFILM AVAILABLE.

A microfilm has been made recently of the book "Root Nodule Bacteria and Leguminous Plants" by Fred, Baldwin and McCoy, Madison, Wisconsin, 1932, and will be filed in the C.S.I.R.O. library, Canberra.

As this book has been out of print for some time, it is advised that the microfilm may be borrowed by anyone wishing to make prints. Please address your enquiry to:

The Librarian,
C.S.I.R.O.,
Box 109, City,
CANBERRA. A.C.T.

C.S.I.R.O.,
Canberra.

- J.H.E. MACKAY.

COMMONWEALTH MYCOLOGICAL INSTITUTE NOTES.FIFTH COMMONWEALTH MYCOLOGICAL CONFERENCE:

The Fifth Commonwealth Mycological Conference was held at the Imperial College of Science and Technology, London, and at other centres from 16th-29th July. Thirty-seven official delegates attended, all Commonwealth countries being represented. Australia's delegates were Dr. C.R. Millikan and Dr. C.J. Magee.

Conference devoted its attention to discussion of plant disease topics of broad rather than special significance and it was notable that applied aspects received close attention.

A session was devoted to "Legislation against seed borne diseases." The present interest of countries in quarantine to exclude diseases and the demand for better quality seed raises the question whether legislation would help. It was clear that many difficulties are involved, not the least of which is the lack of knowledge of simple methods of detecting many seed borne pathogens. The cost of an inspection service would be high, e.g. there are 300,000 seed samples examined for germination each year in U.K. and even if a health test could be carried out at say 12/- per sample, the cost would be £180,000 per annum. It is important that health tests be devised that can be carried out by non-graduate staff that normally does seed testing work. It is easy for countries to make legislation requiring health certificates, but is very difficult to obtain a general health certificate from an exporting country. There is need for more investigation in every country on test methods and also the production of a list of seed borne pathogens which are unknown or not common in each country. There was strong support for the idea of growing seeds in climates or countries where seed stocks can be cleaned up with the object of improving seed quality generally.

The losses which are caused by plant diseases were examined. From instances quoted from different countries - 50 million cacao trees lost from swollen shoot in West Africa (loss of cocoa £11 million sterling per annum), one half the clove trees of Zanzibar dead from sudden death, 33,000 acres of bananas lost to Panama Disease in Jamaica, black pod of cocoa costs £6 million each year in West Africa, Polysora rust of maize has reduced the maize yield in parts of tropical Africa by 40%, root rot of wheat causes an annual loss

1. The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present and for the development of a sound policy for the future.

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3. The third part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present and for the development of a sound policy for the future.

4. The fourth part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present and for the development of a sound policy for the future.

5. The fifth part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present and for the development of a sound policy for the future.

6. The sixth part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present and for the development of a sound policy for the future.

of 12% in Canada, the estimated general loss from plant diseases in New South Wales is about 10%, etc. - it is clear that plant diseases take a heavy toll of production and there is still much work for plant pathologists. The costs of controlling diseases may be high - it costs £7 an acre of control *Cercospora* leaf spot of bananas in Jamaica and damage is still great. Conference drew attention to need for all countries to improve techniques for assessing disease losses and also for recording them. Consideration should be given to standardising methods of recording. Too many estimates of losses were guesses rather than computations based on accurate observations.

The eradication of several important established diseases from Australia aroused much interest. An account was given by Mr. C.G. Hughes of Queensland (paper read by Dr. C.R. Millikan) on the sustained attack on sugar cane diseases by eradication methods which has led to the eradication of gumming, downy mildew and Fiji diseases from Queensland and reduction of others to diseases of minor importance. Dr. C.J. Magee told of the successful eradication of citrus canker from Northern Australia, boil smut of maize from New South Wales, apple scab from Western Australia, cherry leaf spot from N.S.W., the high degree of control achieved with bunchy top of banana in N.S.W. and Queensland and the progress being made by Mr. K. Hutton in N.S.W. in the direction of applying eradication methods to apple scab.

The control of cereal rusts remains one of the most important challenges to plant pathologists and plant breeders and a review of this field in North America by Dr. Hanna revealed a somewhat similar position to that which obtains in Australia. It appears that there will always be a threat from mutations of rust races and that no variety of wheat will permanently meet the problem. It was further suggested that in North America there was a large reservoir of races which had not been detected, and when a new variety is put out, it acts as an indicator for one of these latent races. Rust does not overwinter in the uredospore stage in Western Canada, but outbreaks arise from "spore showers" late in May or June, which probably originate in Mexico. In spite of the prevalence since 1946 of rust race 15B, the susceptible Thatcher is still the predominant North American wheat. The Canadian Department of Agriculture has developed the variety Selkirk and the U.S.D.A. the variety Willis with resistance to race 15B. 150,000 acres of Selkirk are at present being grown for seed. Already a new race 15B3 has

been found which will attack Selkirk, but some of the Kenya wheats are resistant to this race. Co-operative arrangements have been established between Canada, Mexico and U.S.A. to deal with the wheat rust problem. A Rust Conference was held three years ago and another conference is planned to meet in Mexico next year. There is interest now in developing resistant wheats for use in Southern Texas and Mexico to reduce "spore showers". A good deal of attention has been given recently to the possibility of the use of calcium sulphamate as a protectant against rust. This chemical is quite effective and seems to have a systemic action, but somewhat reduces the germination of seed from crops which have been treated. Work on systemic protectants is continuing in U.S.A. and Canada.

The spectacular spread of Puccinia polysora rust of maize throughout tropical Africa since 1949 was described. All varieties were attacked and very heavy losses were caused particularly in rain forest regions. A selection and breeding programme shows promise of overcoming the problem. Several tolerant varieties from Mexico and Central America have been crossed with U.S.A. hybrids and some resistant high yielding varieties have been obtained. Damage from P. polysora is closely linked with high temperature and humidity and the rust may be classified as a truly tropical one.

A session was devoted to antibiotics and fungicides. No antibiotic is yet in regular use for plant disease control although there is promise that streptomycin may find a place for foliage spraying against certain bacterial diseases and for seed treatment. Aureomycin 1 in 1000 might be useful as a seed treatment for control of X. campestris in Swedes. Antibiotics are inactivated in the soil and are unlikely to prove useful for soil treatment. Conference was in agreement that much further research on antibiotics is required aiming at specific antibiotics for specific organisms. Dr. Brian of I.C.I. reviewed laboratory work on systemic fungicides and pointed out that substances structurally related to an important metabolite of the plant or pathogen were most likely to be useful. Systemic fungicides must be able to penetrate and be readily translocated. It is likely that a good fungicide will also be phytotoxic. The possibilities of systemic fungicides, such as griseofulvin, should not be abandoned without further field trials. It is not possible to generalize on the effects of antibiotics, which are bound to be more expensive than conventional fungicides. Referring to low volume spraying, Dr. Moore of East Malling pointed out that 6-8 gallons per acre of 100% lime sulphur would

1. The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations

2. The second part of the paper is devoted to a detailed analysis of the case of the existence of solutions of the system of equations

3. The third part of the paper is devoted to a detailed analysis of the case of the existence of solutions of the system of equations

4. The fourth part of the paper is devoted to a detailed analysis of the case of the existence of solutions of the system of equations

control apple scab and mildew on small trees. The concentrate was safe to use provided it was applied as very small droplets and was well distributed. The National Institute of Agricultural Engineering had co-operated in the development of spray machines suitable for this purpose.

A day was devoted to discussion of virus diseases, prominence being given to the very large number of virus diseases which are now known to affect stone, pome and citrus fruit trees. The importance of latent infections was stressed. These are now known to be widespread and to have about 20% affect on growth. In stone fruits infection caused shock symptoms and the virus then became latent. It seemed probable that most deciduous fruit viruses which have been described are world wide although varieties and climate condition the degree of symptoms seen. The problem of latent viruses is being met at East Malling and in Canada by indexing of propagating material by grafts to known sensitive varieties. In Canada, the possibility of using chemical methods, including paper chromatography, for detecting the presence of virus infections in fruit trees, is being studied. Indexing has revealed that in some varieties, healthy trees have yet to be found. Further research is necessary in separating component viruses and a number of new techniques, including heat therapy, are assisting in this work. The great importance of control of nursery stock in limiting further losses from fruit tree viruses was stressed.

During and after the Conference visits were paid to the Commonwealth Mycological Institute, East Malling, Long Ashton, and Rothamsted Research Stations. The National Institute of Agricultural Engineering and the Forest Products Research Laboratory. A sub-committee met on several occasions to review the work of the C.M.I. and to make recommendations for its future development.

The following resolutions were passed by Conference:-

1. The Conference is of the opinion that since the transfer of planting material from one part of the Commonwealth to another involves a risk of transferring serious plant diseases, it is essential that the service provided by the present plant quarantine greenhouse at Kew should be maintained, but it considers that the method of operating the service needs reviewing.

1. The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations

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and the functions f_i are assumed to be continuous and bounded. The second part of the paper is devoted to a study of the problem of the existence of solutions of the system of equations

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The third part of the paper is devoted to a study of the problem of the existence of solutions of the system of equations

where the functions f_i are assumed to be continuous and bounded.

2. Since the provision of disease-free seed is an important means of safeguarding the health of crops, the Conference considers there is need: (a) for developing standard methods for the rapid and accurate determination of as many seed-borne diseases as possible, and (b) for surveys to be made to discover areas where seed-borne diseases of the various economic crops are at a minimum, with the object of encouraging the production of commercial seed of the highest standard of health.

3. The Conference is of the opinion that there is need to develop uniform methods of recording the losses due to plant diseases in the Commonwealth and that there is also a need for experiments to determine the reduction in yield and quality of crop plants associated with various degrees of infection.

4. In view of the successful eradication of several major diseases from Australia by the vigorous application of sound plant pathological methods, and the measure of success obtained by using similar methods in New Zealand and elsewhere, the Conference urges that all countries should give careful consideration to the possibility of applying such methods, especially to diseases newly introduced or still limited in their distribution.

5. The Conference recommends that with a view to limiting the spread of virus diseases of fruit trees and ensuring that new orchard plantings are established with as healthy material as possible, there is need for increased work on the indexing of nursery stocks of all important tree fruit varieties subject to virus diseases.

6. The Conference considers that planting material of tree and soft fruits transferred from one country to another should, as soon as practicable, be limited to certified material derived from stocks indexed for freedom from virus diseases.

7. The Conference recognises the advantages to plant pathologists of being able to obtain rapid and precise identification of bacterial plant pathogens, particularly in cases where a new bacterial disease is suspected in an area and where early identification of the pathogen is essential to justify efforts to limit or eradicate the disease. The Conference, therefore, recommends that the Permanent Committee of the British Commonwealth Culture Collections should be asked to consider the problem and to review the facilities required for rapid identification

of bacterial plant pathogens, including the possibility of establishing at some central laboratory a collection of specific absorbed sera and/or of bacteriophages.

8. The Conference is of the opinion that there is urgent need for more taxonomic work in mycology to provide a sound basis for the identification of pathogens of importance in plant pathology. They concluded that the only way in which such work can be encouraged is by the creation of further posts in taxonomic mycology. They stressed the need for the creation of such posts, both at the Commonwealth Mycological Institute and at other suitable institutions and recommended that the Executive Council of the Commonwealth Agricultural Bureaux should draw this matter to the attention of appropriate authorities.

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